



COMMENTARY

European Forensic Veterinary Pathology Comes of Age

Ranald Munro^{*,†,‡,§}, Lorenzo Ressel^{†,‡,§§}, Andrea Gröne^{‡,‡,‡},
 Udo Hetzel^{§,‡,‡}, Henrik E Jensen^{||,‡,‡}, Orlando Paciello^{¶,‡,‡}
 and Anja Kipar^{§,#,†,‡,‡,§§}

* Dunblane, Scotland, † Department of Veterinary Anatomy, Physiology and Pathology, Institute of Infection, Veterinary and Ecological Sciences, University of Liverpool, Neston, UK, ‡ Division of Pathology, Department of Biomolecular Health Sciences, Faculty of Veterinary Medicine, Utrecht University, Utrecht, the Netherlands, § Institute of Veterinary Pathology, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland, || Faculty of Health and Medical Sciences, University of Copenhagen, Denmark, ¶ Department of Veterinary Medicine and Animal Production, University of Naples, Naples, Italy, # Institute of Infection, Veterinary and Ecological Sciences, Faculty of Health and Life Sciences, University of Liverpool, Neston, UK and †† Department of Veterinary Biosciences, Faculty of Veterinary Medicine, University of Helsinki, Finland

Summary

During the mid-1700s, development of the veterinary profession was largely focussed on equine medicine and surgery. Subsequently, rather erratic development encompassed other species and eventually led to specialization in different disciplines. Teaching of veterinary pathology was well established in Europe and North America by the late 19th century. Specialization in this discipline was boosted in the 1940s by the formation, in the USA, of the Register of Veterinary Pathology and American College of Veterinary Pathologists. National societies followed soon afterwards in Europe. The European Society of Veterinary Pathology evolved during this period and the European College of Veterinary Pathologists (ECVP) was created in 1995 to promote high standards in the discipline. As an accrediting body, its emphasis is on training and harmonization across Europe. There is an increasing demand for high-grade forensic veterinary pathology reports which address the requirements of the legal system, but so far only a few countries have defined protocols for these reports. In recognition of the need for a specific qualification that benchmarks the competences and experience expected of forensic veterinary pathologists, the ECVP recently launched the Certificate in Forensic Veterinary Pathology.

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The Genesis of Veterinary Pathology

Much has been written on the foundation of the veterinary profession and the importance of the establishment, in 1761, of the world's first official veterinary school in Lyon. Other veterinary colleges

were formed relatively quickly thereafter in various European countries, including Austria, Britain, Denmark, France, Germany, Italy, Spain, Sweden and The Netherlands, reflecting public pressure for improvements in the diagnosis and treatment of well recognized diseases, such as rinderpest.

However, the influence wielded by the equestrian academies and well-to-do riders, in the 18th century, ensured that the early focus of the newly established veterinary schools was on the saddlehorse, as it was considered to be a noble animal and was of military

Correspondence to: A Kipar (e-mail: anja.kipar@uzh.ch).

‡‡ All authors are members of the European College of Veterinary Pathologists Certificate in Veterinary Pathology Steering Group. §§ L Ressel and A Kipar are also members of the European College of Veterinary Pathologists Education Committee.

importance. This focus is believed to have hindered, for many decades, appropriate attention being paid to other species (Mitsuda, 2007). Indeed, Edward Coleman, a human surgeon, who headed the London veterinary school for 45 years after its establishment, 'was unassailably in a lifelong opinion that diseases of animals (other than the horse), were unworthy of veterinary notice' (Pattison, 1984).

Fortunately, the absurdity of this view was eventually overcome and the breadth of the veterinary surgeon's remit extended to address the multitude of diseases in other domestic (and latterly free-living) animals. The textbook *Canine Pathology* (Blaine, 1841) is a relatively early example of this diversification. Such diversity, however, brought with it the enduring veterinary problem of the impossibility for a veterinarian to be knowledgeable on all maladies of all species. Specialism was required.

The ever-increasing body of literature, based on human autopsy findings and accompanied by the advances stimulated by Virchow's studies of cellular changes, led to pathology becoming a recognized speciality in human medicine around the mid-19th century (Schultz, 2008). Veterinary pathology lagged behind to some degree. However, in Germany, the government strongly supported the establishment of the state veterinary service, with meat hygiene as a major interest. The abattoirs were used to investigate disease through the collection of 'biological and microscopic specimens' (Schwartz, 1903). This laid the foundation for a science-based approach to veterinary pathology. Virchow's interest in comparative pathology also encouraged studies in domestic animals.

In North America, veterinary pathology was first taught at the Montreal Veterinary College in Canada, by William Osler. He had studied with Virchow in Berlin before being invited to teach, in 1876, at the Montreal college by its founder Duncan McEachran, an Edinburgh veterinary graduate. It was not until Osler left the Montreal Veterinary College in 1884 that other North American veterinary colleges began to teach pathology as a discipline (Saunders, 1987).

During the second world war, the Army Medical Museum (AMM) in the USA expanded its role as the central laboratory for diagnostic pathology. This led to a significant increase in activity in veterinary pathology at the AMM and to the establishment in 1944 of the Registry of Veterinary Pathology. The American College of Veterinary Pathologists was created in 1949 with the aims of (a) furthering scientific progress in veterinary pathology, (b) establishing standards of training and experience of specialists to be qualified in veterinary pathology and (c) increasing recognition of such qualified specialists (Jones, 1990).

The foundations of the European Society of Veterinary Pathology (ESVP) were in Germany, where an 'Arbeitsgemeinschaft der Veterinärpathologen' was founded in 1951. In 1968, the name was changed to 'Europäische Arbeitsgemeinschaft der Veterinärpathologen' and, in 1974, to 'Europäische Gesellschaft für Veterinärpathologie'. These changes reflected the interest and regular attendance at the biannual autumn meeting by veterinary pathologists from other, non-German speaking European countries, such as Belgium, Italy, Spain and The Netherlands. In 1994, the ESVP eventually received its current name and became a true European organization. In France, a national society, the Société Française d'Anatomie Pathologique Vétérinaire, was founded in 1962. The Nordic countries do not each have their own national societies for veterinary pathology. Instead, in 1977, pathologists from Denmark, Finland, Norway and Sweden established the Nordic Society of Veterinary Pathology, which was more recently joined by Iceland. In Italy, the 'Associazione Patologi Italiani Veterinari' was founded in 1982 and held its first meeting in April of that year, in Bologna. In 2004, in Milan, it was renamed 'Associazione Italiana di Patologia Veterinaria'. In Switzerland, a national association, the 'Schweizerische Vereinigung für Tierpathologie', was founded in late 1987 in Bern. Spain followed 2 years later when the 'Sociedad Española de Anatomía Patológica Veterinaria' was founded in Madrid in January 1989. Similar awareness of the importance and relevance of veterinary pathology occurred widely in Europe with individual countries developing the specialism and a national association in line with their own circumstances and demands. The most recent national initiative in the field in Europe was probably the foundation of the British Society of Veterinary Pathology in 2006.

In 1995, the ESVP established the European College of Veterinary Pathologists (ECVP), with the aim of advancing veterinary pathology and promoting high standards within the speciality in Europe. The ECVP, one of the specialty colleges under the umbrella of the European Board of Veterinary Specialisation, considers specialization as a means of providing a more competent service to the public and institutions, thereby increasing the usefulness of the profession. The ECVP lays emphasis on its role as an accreditation body for the specialty, on the establishment of criteria for training and experience and on their harmonization across Europe. Overall, the specific objectives of the ECVP are very similar to those of its North American counterpart. Both the ACVP and ECVP offer an internationally recognized specialty qualification; their mutually recognized diploma is granted after a high standard, quality controlled examination.

However, the specialized nature and importance of veterinary pathology was already recognized in Europe prior to the establishment of the ECVP. This is reflected in national qualifications such as the Fellowship of the Royal College of Pathologists (a body that represents both medical and veterinary pathology) in the UK, the German 'Fachtierarzt' and the French 'Diplôme d'Etudes Spécialisées Vétérinaires en Anatomie Pathologique'.

Forensic Veterinary Investigations

Throughout the many years of rather erratic development of the veterinary profession, individual veterinarians would have been asked to provide opinions and evidence on cases where animals were the centre of legal disputes. There is, unfortunately, a paucity of reports on the value or outcome of these activities. Nevertheless, [Munro and Munro \(2008\)](#), in the chapter on sexual abuse of animals, point out that such cases were being recognized as far back as 1902 in Germany.

Early attempts to provide post-mortem data of a standard acceptable to law enforcement officers, regarding estimation of the time of death in wildlife, were made in the 1960s ([Neubrech, 1960](#)). Various other studies, in deer, using thigh and nasopharyngeal temperature were undertaken in the 1980s (eg, [Kienzler et al., 1984](#)) and highlighted the drive to produce legally robust reports and opinions. Subsequent investigations of the post-mortem interval in other species (dogs, cats and pigs) exploited additional methodologies such as histopathology, radiology, post-mortem chemistry, electrical stimulation of muscle and nerves, DNA/RNA analyses and entomology ([Munro and Munro, 2012](#)). Preliminary studies on the use of post-mortem bacteriology as a means of establishing the time since death have also been conducted ([Listos et al., 2017](#)). The 'Battered Pet' series of papers by Munro and Thrusfield, published in 2001, established the criteria that raise suspicion of physical abuse in companion animals and provided the stimulus for more detailed investigation of companion animal abuse ([Munro and Thrusfield, 2001a, b](#)). Veterinary pathologists, confronted with alleged abuse cases, finally had a set of diagnostic pointers on which to base interpretation of injuries discovered at necropsy. These papers also complemented, directly, the burgeoning work on family violence by Phil Arkow and Frank Ascione ([Arkow and Munro, 2008](#)).

Forensic Veterinary Pathology

Interest in, and demand for, high-quality forensic investigations related to unexplained or suspicious inci-

dents involving companion, farm and free-living animals has risen during the last decade ([Listos et al., 2015](#); [Newbery et al., 2016](#)). In 2015, a survey of the attitudes of Europeans towards animal welfare in the 28 member States of the European Union was conducted ([Anon, 2016](#)). Eighty-two per cent of Europeans expressed the view that farm animal welfare should be better protected. Additional protection for companion animals was supported by 72% of those questioned. This overwhelming support for better animal welfare reflects a Europe-wide public desire for greater action to be taken by the European Commission and national governments. The consequence of better enforcement of new regulations and laws will drive a continuing rise in welfare prosecutions and result in an increasing demand for quality forensic veterinary reports.

However, so far only a few countries have developed protocols as a basis for a defined standard of forensic pathology reports (eg, [Paciello and Fico, 2019](#)) to prosecuting authorities. It is therefore likely that the overall standard is extremely variable. The study by [Ottinger et al. \(2014\)](#) outlined the situation surrounding forensic veterinary pathology, particularly in Europe, and is a step towards understanding how the increasing demand for forensic examinations may be managed. Investigations involving dogs and cats appear to predominate but, as always in veterinary medicine, a wide range of species is involved.

The often patchy and inadequate nature of contacts amongst the legal profession, judicial systems and veterinary pathologists undertaking forensic examinations *post mortem*, remains a hindrance to improvement of the standard of veterinary reports submitted as evidence. Veterinary pathologists wishing to undertake forensic necropsies may appreciate, and benefit from, training or guidance in the relevant aspects of the legal process. As [Gerdin and McDonough \(2013\)](#) rightly comment, 'in veterinary forensic pathology, simply conducting a necropsy, compiling morphologic diagnoses and generating a standard report are at best insufficient and at worst irrelevant if it does not address the needs of the legal system.' The conclusions of a survey of 200 prosecuting attorneys in the USA adds further support: 'Veterinary forensic evidence, including forensic necropsies and detailed medical reports, was viewed as an important factor by a majority of prosecutors in deciding whether to accept a case for prosecution and in achieving a successful outcome, but a need for additional training for investigators was indicated' ([Lockwood et al., 2019](#)). [Newbery et al. \(2016\)](#) in their article on the interactions amongst veterinary clinicians, pathologists and law enforcement agencies drew attention to the opportunities for improved

training in the UK. Over the past 20 years, the literature on forensic veterinary pathology has expanded considerably. Sources of information include textbooks (Cooper and Cooper, 2007; Munro and Munro, 2008; Brooks, 2018), reviews, special journal editions (Caswell, 2016) and a range of peer-reviewed papers covering diverse aspects of forensic veterinary pathology. This body of knowledge will continue to grow, with publications from around the world, providing insights, and therefore more accurate interpretations, of the multiple challenges that currently confront the forensic veterinary pathologist.

How do Diagnostic and Forensic Necropsies Differ?

A veterinary forensic examination *post mortem* is conducted with the aim of providing a fully documented, unbiased expert report on bodily condition, all injuries, post-mortem changes and disease-related lesions present in an animal cadaver. If possible, the cause of death is determined and stated. Should only part of an animal be submitted for examination (eg, a cow's lower limb), the examination is equally comprehensive although speculation as to the cause of death would normally be avoided. These necropsies are usually requested by regulatory authorities, police, animal welfare societies and animal conservation organizations. Decisions on whether court proceedings should be instigated are often guided by the forensic necropsy report.

The descriptive and interpretive skills required when conducting a forensic necropsy are similar to those acquired during a veterinary pathology residency (McDonough *et al.*, 2015). However, there are major differences regarding the standard of thoroughness of the diagnostic and forensic necropsy procedures. The completeness and documentation of the information recorded and the accuracy of the paperwork, including signing and dating, is generally greater in forensic examination *post mortem*, for which a Standard Operating Procedure (SOP) should be available (Barington *et al.*, 2018). This meticulous attention to all bodily organs and systems and the accurate recording of observations allow preparation of necropsy reports that fulfil the requirements of the courts. Occasionally, a diagnostic necropsy may, unexpectedly, become an integral part of a forensic investigation. Therefore, understanding of 'the forensic approach' to examination *post mortem* and applying it as standard to all necropsies can be most useful although in many situations this is not currently achievable.

Preparation for a forensic necropsy begins before the pathologist enters the post-mortem room and some necessary procedures and processes take place

after the necropsy is completed. At the start, systems such as SOPs need to be in place for receipt, handling and labelling of submissions. Instructions received regarding the submission are logged, the chain of evidence is maintained and appropriate storage for the specimens is ensured (Newbery and Munro, 2011).

Once in the post-mortem room, the pathologist needs to keep in mind that the necropsy report may form an essential part of evidence subsequently relied on in court or used to guide decisions on handling the case. As such, the report must be accurate and objective. Legal processes vary amongst jurisdictions, but intense scrutiny of the veterinary report and the SOP may well occur. Thoroughness is a key requirement during forensic necropsies. Measurements, good contemporaneous notes and photographic documentation with appropriate measurement scales and identification labels, are essential. Similarly, collecting appropriate tissues for subsequent histopathology is a simple but essential routine. Thoroughness also means documenting all lesions (and recording 'no significant findings' in undamaged organs) whether or not these seem to be associated with the cause of death or injury. At all stages of the necropsy, it is worth remembering that the pathology evidence is only part of the whole picture. There may be other important information, such as clinical reports, radiographs, MRI scans and witness accounts, about which the pathologist is unaware. Furthermore, pathologists must consider that other forensic professionals (eg, entomologists or ballistics experts) can be extremely important in providing crucial evidence that assists in elucidating the sequence of events.

Report writing for forensic necropsies may differ from that of diagnostic examination *post mortem* because the report is often directed towards the legal profession and non-veterinary authorities. Writing reports using veterinary medical language and jargon, which is quite suitable when addressing the report to another veterinarian, is unhelpful for lawyers since they may not be familiar with the language used. If presented with a jargon-filled report, lawyers will usually ask for an interpretation of the report by an independent veterinarian and in so doing some of the subtleties and nuances of the original report will be lost. This hazard can be readily overcome by using plain language in the necropsy report. Technical terms may be included in brackets after the 'plain language' word or phrase to add precision. An alternative is to include a glossary of terminology. Irrespective of the style of writing, it is essential for reasons of clarity and avoidance of unconscious bias, that all findings (positive and negative) are considered in the comments. By so doing, the pathologist

sets out the basis for the interpretation of the necropsy findings. The report's conclusions then flow naturally from this point.

The ECVP Certificate in Forensic Veterinary Pathology

The forensic veterinary pathologist is an expert witness who should provide a balanced independent opinion on the post-mortem findings in animal cadavers or parts thereof, at the centre of legal or other arbitration proceedings. This is a highly responsible undertaking, which relies on the completeness and objectivity of the observations and on the pathologist having the necessary experience and knowledge to arrive at an informed opinion, based on the totality of the necropsy findings.

Diplomates of the ECVP have all completed the same training, study and examinations. Consequently, they share a similar understanding of, and approach to, veterinary pathology. In essence they have a 'common language'. In the forensic context this is hugely beneficial because, irrespective of whether they act for the prosecution or defence, their consistent interpretation of necropsy findings and use of similar terminology limits the likelihood of misunderstandings. Building on the acknowledged specialist status of the diplomates, the ECVP has launched the Certificate in Forensic Veterinary Pathology (ECVP-CFVP) in recognition of the need for a specific qualification that benchmarks the competences and experience expected of forensic veterinary pathologists. Quality of evidence gathering, use of SOPs, thoroughness of examination, completeness of reporting and reliability of conclusions reached by the pathologist, all form part of the assessment. By embracing and promoting the ECVP-CFVP, the justice process in Europe will undoubtedly be enhanced by having an internationally recognized standard on which to rely.

Assessment of the first cohort (2020) of candidates for the ECVP-CFVP is in progress. Over the coming years, the aim is to establish a network of certificate holders in Europe. Through this process, good practice in forensic veterinary pathology will be encouraged and endorsed. Additionally, certificate holders will be pivotal in developing a better understanding of the many intellectually challenging issues that arise as a consequence of the diversity of species, breeds and circumstances encountered in forensic veterinary pathology. It is likely that the assessment process of candidates for the ECVP-CFVP will evolve in line with the increasing knowledge base. However, the eligibility criteria for potential candidates will continue to provide clarity on the defined competencies and experience expected of a certificate holder.

Details of how to register as a candidate for the next round of assessments can be accessed at <https://ecvpath.org/> and then by following the link to ECVP-CFVP.

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